

TENNESSEE VALLEY AUTHORITY

ALTERNATIVES TO BE EVALUATED FOR DAM SAFETY MODIFICATIONS AT CHEROKEE, FORT LOUDOUN, TELlico, AND WATTS BAR DAMS

Tennessee Valley Authority (TVA) reevaluates its dam safety program as technology and standards evolve, and when more or better data become available. Additionally, dam modifications are made as needed to ensure the structural integrity of the TVA dams and the safety of the public. As part of the dam safety program, periodic updates regarding maximum flood conditions are conducted when parameters used in flood modeling change, e.g., probable maximum precipitation or river operation guidelines.

As a precaution, TVA assumes the most extreme weather event reasonably possible when determining maximum flood conditions of the river system. TVA's most recent probable maximum flood (PMF) calculations indicate that a worst-case winter storm could cause water to go over the top of some dams even with the floodgates wide open, possibly causing dam failure. Failure of any dam would result in loss of stored water for navigation, impacts to fish and wildlife resources, loss of recreational opportunities, and possible property damage, personal injury, and loss of life. Failure also could result in failures to downstream dams.

To minimize the potential effects of a severe flooding event predicted by revised PMF modeling, temporary precautionary measures have been implemented on top of the earth embankments at four (Cherokee, Fort Loudoun, Tellico, and Watts Bar) dams. These measures included raising dam elevations about 3 to 4 feet by placing interconnected, fabric-lined, sand-filled HESCO containers in order to safely pass predicted worst-case floodwaters, to avoid dam overtopping and possible impacts to the downstream embankment, and to provide additional floodwater storage capacity. The downstream embankment of Watts Bar Dam has also been strengthened with concrete matting. TVA must now develop permanent solutions for the precautionary measures that were put in place to correct safety deficiencies identified at these dams. The need for the proposed action is to prevent the potential impacts associated with a possible dam failure.

TVA has developed alternatives that consider the level of risk reduction to the public, constructability, potential environmental impacts, and cost.

TVA has performed preliminary internal scoping and identified a No Action Alternative and two Action Alternatives: (1) Permanent Modifications to Dam Structures and (2) Removal of the Temporary HESCO Baskets Before the End of Their Useful Life.

No Action Alternative

The No Action Alternative is the current existing condition at the Cherokee, Fort Loudoun, Tellico, and Watts Bar dam sites. A permanent concrete mat structure has been installed in the downstream embankment of Watts Bar Dam, and HESCO baskets have been installed at Cherokee, Fort Loudoun, Tellico, and Watts Bar dams. These items would remain in place and would be maintained as needed. These temporary measures were installed to prevent floodwaters from potentially overtopping the dams and to ensure the integrity of the downstream embankments, thus increasing the public safety of downstream residents and the safety of TVA's critical nuclear facility operations.

Modifications that have been implemented to effectively raise dam embankments 3 or 4 feet and to prevent flood overtopping and potential impacts to the dam downstream embankments and possibly dam failure are described and depicted below.

Cherokee Dam

Using 2,261 baskets that contain 8 million pounds of sand, TVA raised the north embankment, south embankment, and the saddle dam of the Cherokee Dam by 3 feet for a total of 6,780 feet. Additionally, TVA placed 2,500 tons of riprap on the downstream side of the north embankment.



Cherokee Dam – South Embankment

Fort Loudoun Dam

TVA used 1,970 baskets (8.4 million pounds of sand) to raise the earth embankment and one saddle dam of Fort Loudoun Dam. Approximately 2,750 feet was raised by 4 feet and another 600 feet was raised by 3 feet.



Fort Loudoun Marina – Saddle Dam

Tellico Dam

At Tellico Dam, TVA raised the portion of the concrete dam, the earth embankment, two saddle dams, and the pedestrian walkway. Approximately 6,011 feet of embankment was raised by 4 feet utilizing 1,993 baskets (9.8 million pounds of sand).



Tellico Dam – Embankment and Walkway

Watts Bar Dam

At Watts Bar Dam, TVA used 540 HESCO baskets containing 1.6 million pounds of sand for a length of 1,600 feet to raise the earth embankment by 3 feet.



Watts Bar Dam – East Embankment

To ensure Watts Bar main dam integrity, TVA needed to protect the downstream slope below the existing concrete floodwall. Two acres were protected using ArmorFlex® concrete mats. A total of 373 concrete mats were placed on the embankment ranging in weight from 5,000 pounds to 13,000 pounds each.



Watts Bar Dam – Downstream Embankment

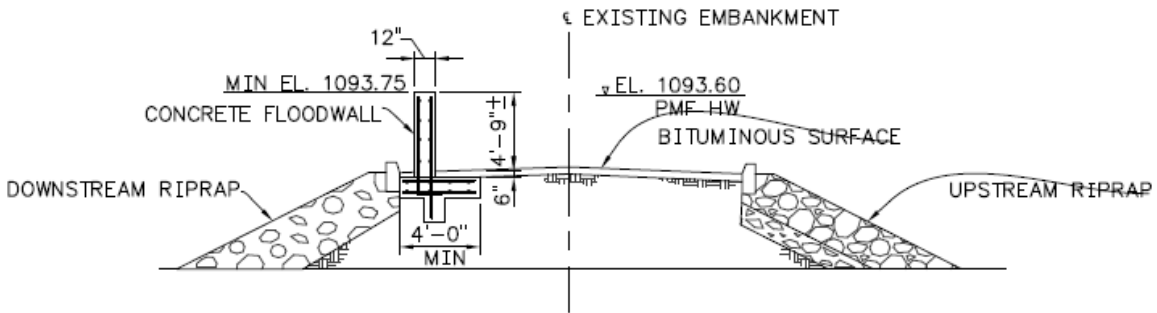
Action Alternative A – Permanent Modifications of Dam Structures

Under Action Alternative A, the HESCO baskets would be removed, and permanent dam modifications would be made to each of the four dam structures. The potential modifications could include construction of concrete floodwalls, raising of earth embankments, or a combination of floodwalls and raised earth embankments. The permanent concrete mat structure in the downstream embankment of Watts Bar Dam would remain in place. Under this alternative, the potential for overtopping of the dams during a PMF event would be prevented. This would ensure that the integrity of the downstream embankments would be maintained and thereby increase the public safety of downstream residents and the safety of TVA's critical nuclear facilities.

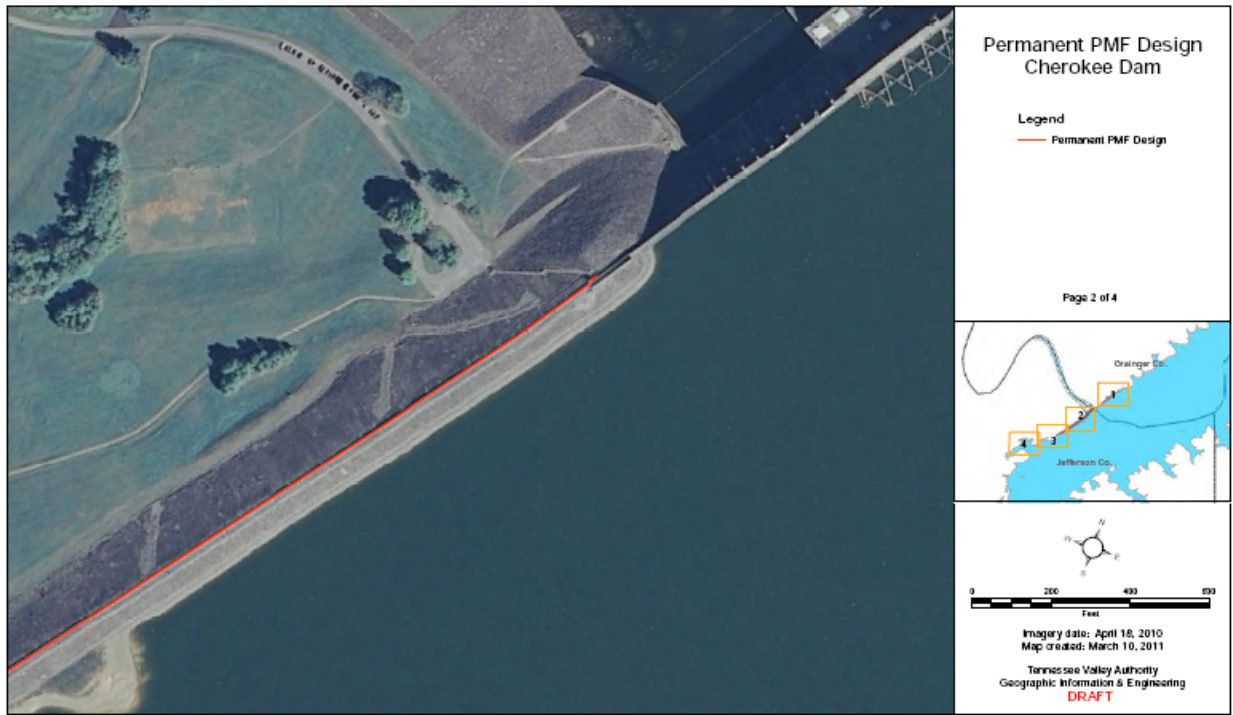


(Common route: Floodwall downstream side of dam.)

Cherokee Dam – North Embankment From Oxygen Pad Southwest to Dam



Cherokee Dam – PMF Floodwall Concept – North and South Embankments



(Common route: Floodwall downstream side of dam.)

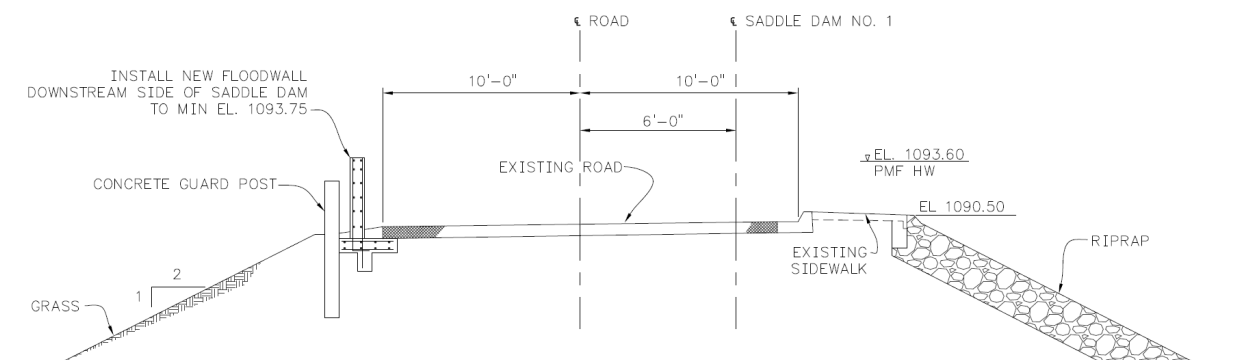
Cherokee Dam – Dam to Approximately 1,700 Feet on South Embankment



(Common route: Floodwall downstream side of south embankment.)

Cherokee Dam – South Embankment From Approximately 1,700 feet on South Embankment to Parking Area 3 Across Saddle Dam 1 to Parking Area 5

Option 1: Floodwall starts just west of opening to Parking Area 4 and continues southwest along downstream side of Saddle Dam 1, would leave ingress/egress into Parking Area 4 open.



Cherokee – PMF Floodwall Concept – Saddle Dam No. 1

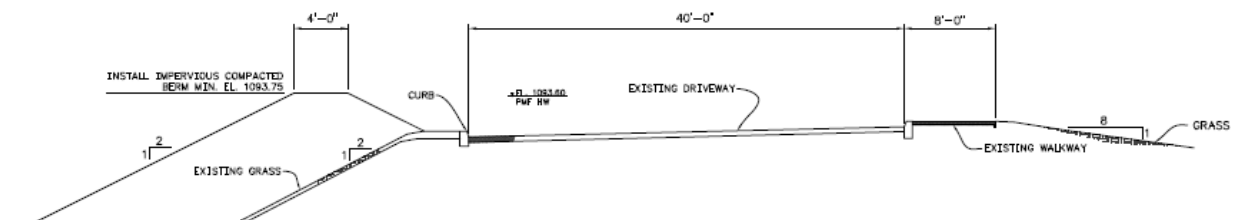


Cherokee Dam – Parking Area 5 to Visitors Restroom to Boat Ramp Parking

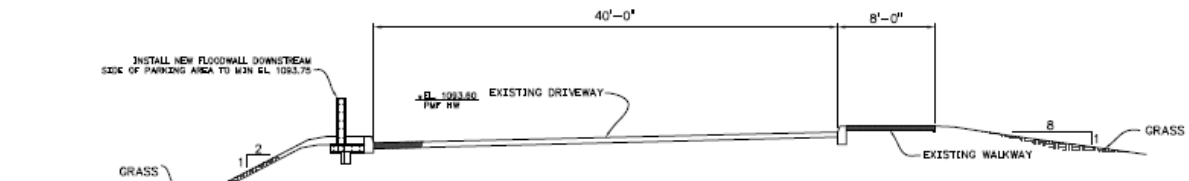
Option 1: Floodwall located on the north side of road would terminate northeast of visitors restroom. Floodwall would connect to area of raised elevation near the restroom and terminate at higher elevation at the entrance to the boat ramp.

Option 2: Earth embankment connects (figure indicated as page 3 of 4) west to final portion of Option 1 floodwall (figure indicated as page 4 of 4).

Note: Possible fix for openings would be to raise roadways to required PMF elevations.



Cherokee Dam – PMF Raised Embankment Concept – Boat Ramp Parking Area

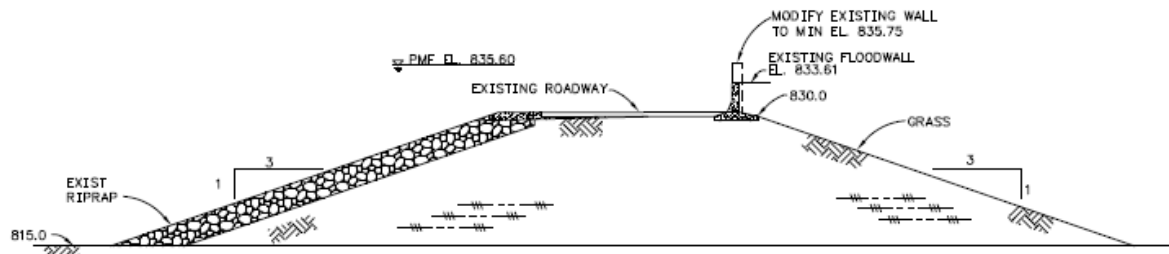


Cherokee Dam – PMF Floodwall Concept – Boat Ramp Parking Area

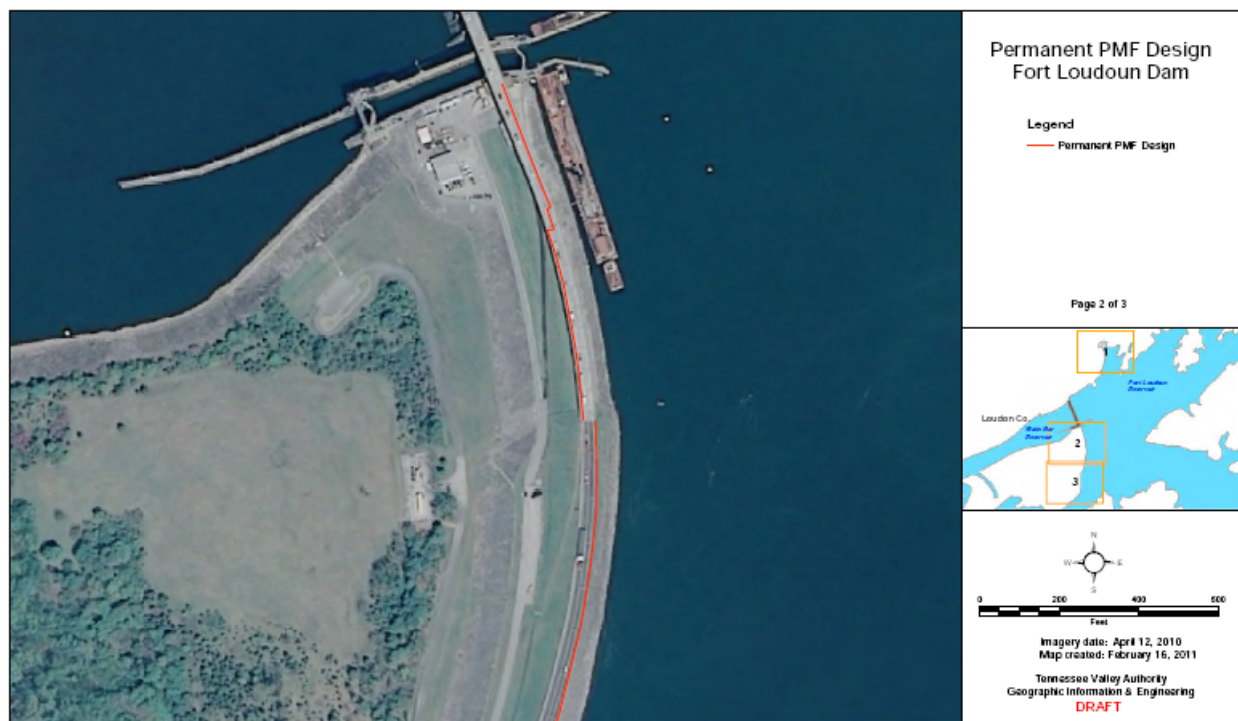


(Common Route: Floodwall north side of roadway, City Park Drive, where sand baskets are currently located)

Fort Loudoun Dam – North Side Saddle Dam, North of Fort Loudoun Marina

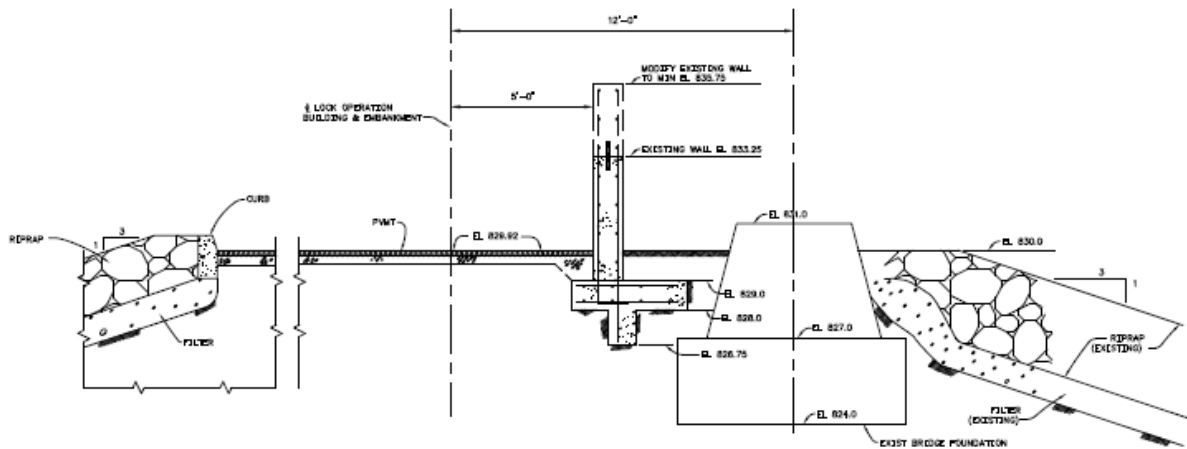


Fort Loudoun Dam – PMF Floodwall Concept – North Side Saddle Dam



(Common route: Floodwall underneath roadway [US-321 bridge] to transition on US-321 at bridge abutment. Floodwall continues at bridge abutment transition and continues south on the eastern side of the roadway toward the Tellico Recreation Area.)

Fort Loudoun Dam – Dam/Lock South to Approximately 2,000 Feet From Tellico Recreation Area

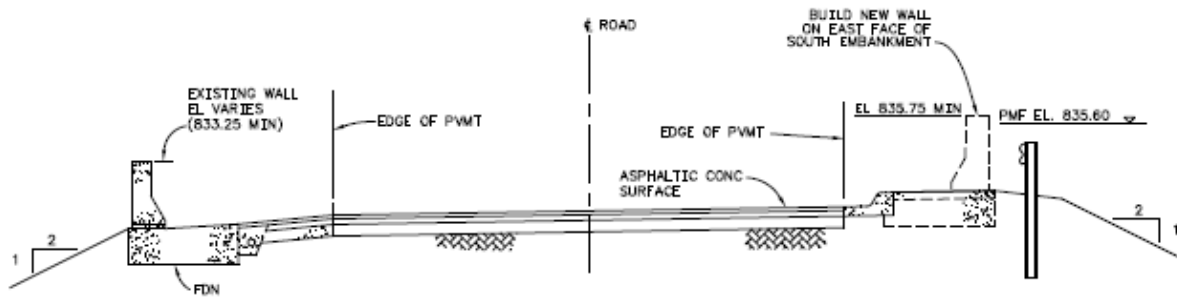


**Fort Loudoun Dam – PMF Floodwall Concept – Under 321 Bridge
Adjacent to Lock and Lock Operations Building**



(Common route: Floodwall is located on the east side of US 321 south along the on ramp from Tellico Parkway, terminating at the entrance to the Tellico Recreation Area. Opening would exist at Tellico Recreation Area Access Road. Possible fix for openings would be to raise access road to required PMF elevations.)

**Fort Loudoun Dam – From Approximately 2,000 Feet North to
Tellico Recreation Area**



Fort Loudoun Dam – PMF Floodwall Concept – Highway 321



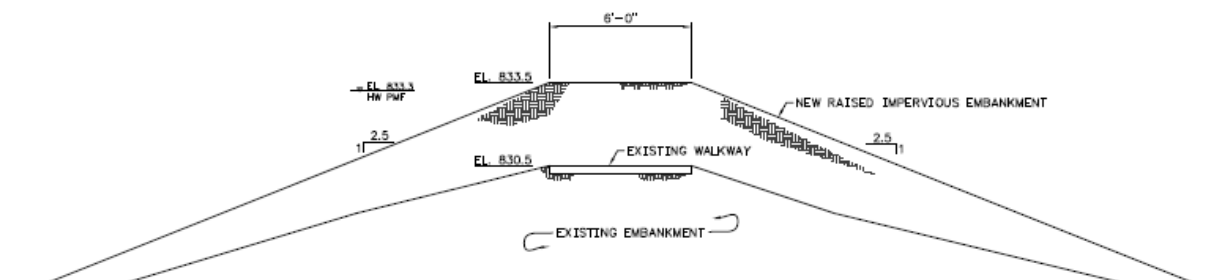
Tellico Dam – View of Tellico Recreation Area Toward Tellico Dam



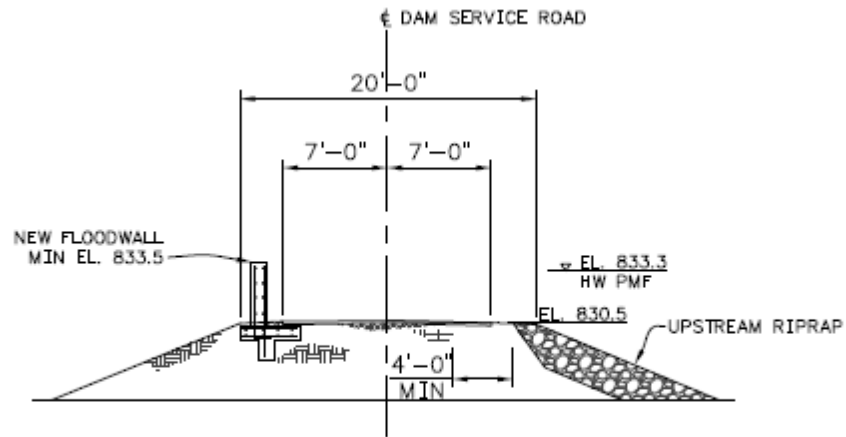
Tellico Dam – Alternate View of Tellico Recreation Area Toward Tellico Dam

Option 1: Floodwall from entrance to Tellico Recreation Area southwest approximately 300 feet turning northwest continuing approximately 1,800 feet to main embankment. All embankments a minimum of 2.5:1 slope.

Option 2: Combination of Option 1 (Page 1 of 7) to parking lot/walkway area and then raised earthen embankment for ~1800 ft. to Tellico Dam access road. Current walkway would be located on top of raised earthen embankment.



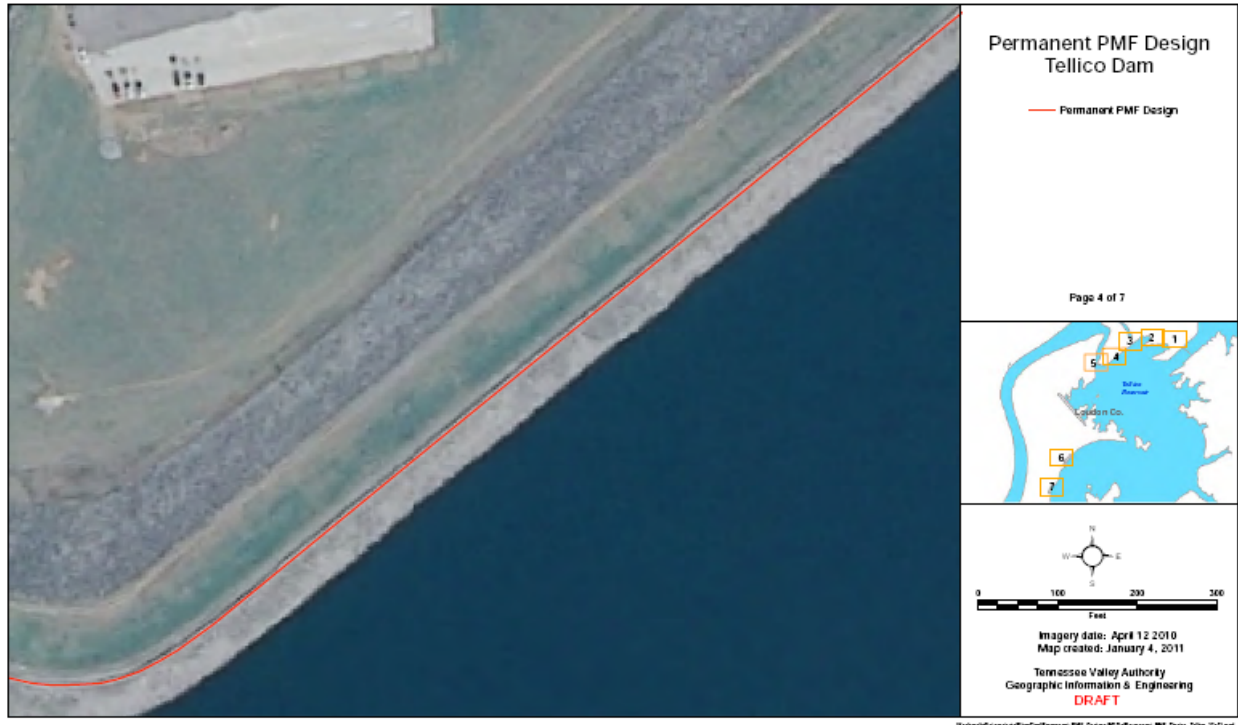
Tellico Dam – PMF Raised Embankment Concept



Tellico Dam – PMF Floodwall Concept – Main Embankment



Tellico Dam – View of Canal Saddle Dam and Dam Access Road



Tellico Dam – View of Canal Saddle Dam and Dam Access Road

Floodwall would be located on the downstream side of Tellico Dam Access Road from raised earthen embankment southwest toward Tellico Dam.



Tellico Dam – View of Concrete, Saddle Dam, and Dam Access Road

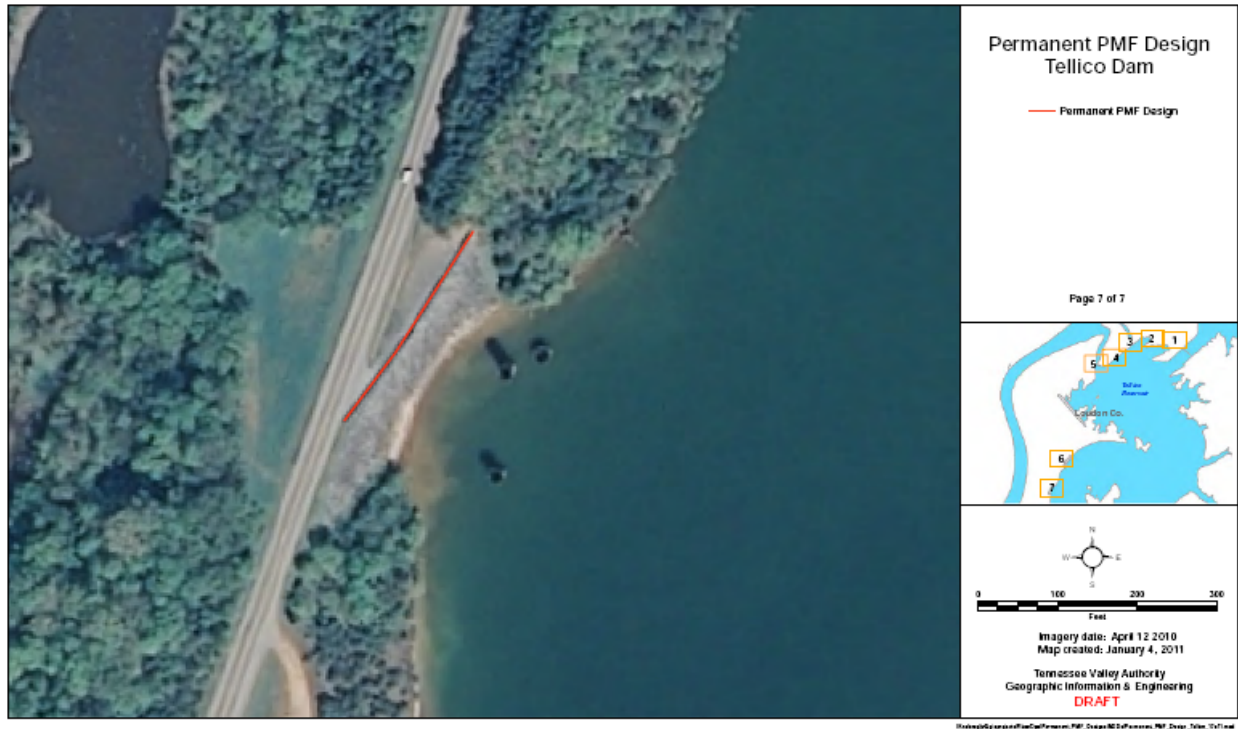
Floodwall continues to east training wall of Tellico Dam on the downstream side.



Tellico Dam – Saddle Dam 2 (Northeast)

Option 1: Saddle Dam 2 (approximately 500 feet) raised earthen embankment, minimum 2:1 slope with riprap (upstream), 2.5:1 without rip rap (downstream)

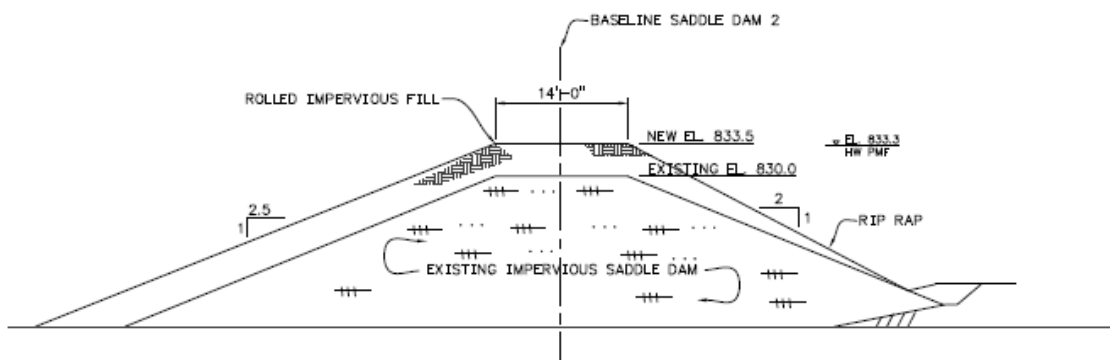
Option 2: Saddle Dam 2 (approximately 500 feet) floodwall



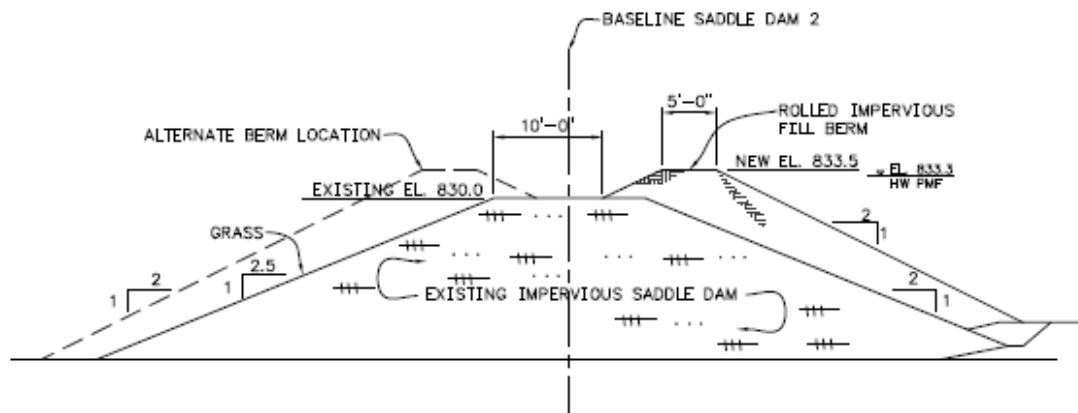
Tellico Dam – Saddle Dam 3 (Southwest)

Option 1: Saddle Dam 3 (approximately 300 feet) raised earthen embankment, minimum 2:1 slope with riprap (upstream), 2.5:1 without (downstream).

Option 2: Saddle Dam 3 (approximately 300 feet) floodwall



Tellico Dam – PMF Raised Embankment Concept 1 – Saddle Dams 2 and 3



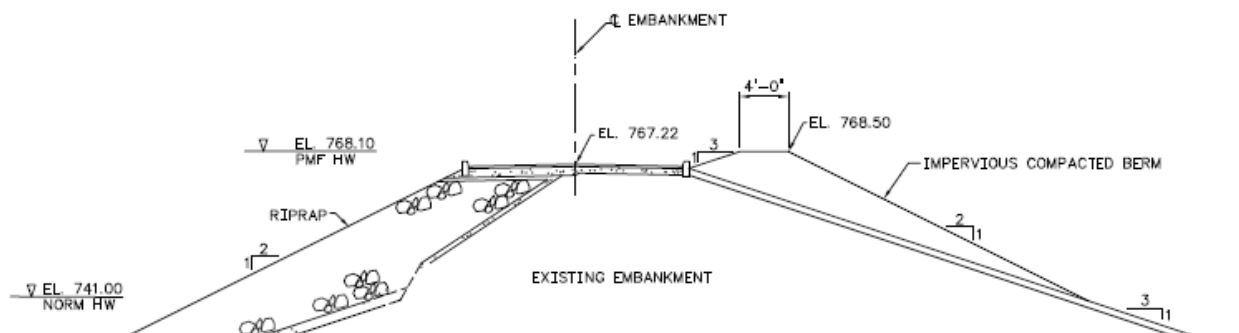
Tellico Dam – PMF Raised Embankment Concept 2 – Saddle Dams 2 and 3



(Common route: Earthen embankment or berm from higher earthen embankment perpendicular to Highway 68 past recreation area to camping area located to the north, approximately 1,700 feet in length.)

Watts Bar Dam – East Embankment

Earthen Embankment would be on a 3:1 slope with riprap (upstream) and 2:1 (downstream). Other access areas need to be assessed to see if they can be closed.



Watts Bar Dam – Raised Embankment Concept

Action Alternative B – Removal of the HESCO Baskets Before the End of Their Useful Life

Under Action Alternative B, TVA would consider removal of the temporary HESCO baskets from the dam structures before the end of their useful life. The permanent concrete mat structure installed in the downstream embankment of Watts Bar Dam would remain in place. This proposed alternative is similar to the conditions at the dams prior to temporary placement of the HESCO baskets for management of the potential maximum flood events. Under this alternative, overtopping of the dams would be possible during a very low-risk PMF event. The downstream integrity of the dam embankments could be compromised, thus jeopardizing the public safety of downstream residents and the safety of TVA's critical facilities. The analysis of this alternative would contain a discussion/justification regarding the reasons for the temporary placement of the baskets on top of the dams.

Environmental Review and Public Participation

TVA will prepare an environmental assessment (EA) or an environmental impact statement (EIS) to address the potential environmental effects of installing permanent modifications to Cherokee, Fort Loudoun, Tellico, and Watts Bar dams in Grainger, Jefferson, Loudon, Rhea, and Meigs counties, Tennessee.

Public comments are invited on both the scope of the project and environmental issues that should be addressed. Comments may be [submitted online](#), or must be postmarked or e-mailed no later than August 5, 2011. Please note that any comments received, including names and addresses, will become part of the project administrative record and will be available for public inspection.

If TVA decides to prepare an EIS, a notice of availability of the draft document will be published in the *Federal Register*, and announcements will be placed in local news media.

Next Steps

The environmental review will contain descriptions of the existing environmental and socioeconomic resources within the area that would be affected by construction, operation, and maintenance of the proposed permanent dam modifications. Evaluation of potential environmental impacts to these resources will include, but will not necessarily be limited to, the potential impacts on water quality, aquatic and terrestrial ecology, endangered and threatened species, wetlands, aesthetics and visual resources, recreation, land use, historic and

archaeological resources, and socioeconomic resources. The preliminary identification of reasonable alternatives and environmental issues in this notice is not meant to be exhaustive or final. The results of TVA scoping will be utilized to develop the final alternatives and resource issues to be evaluated in the environmental review.

Project Timeline

June 22, 2011	Issue the notice of intent for environmental review; public scoping comment period begins (30 days)
August 5, 2011	Deadline for scoping comments
August 2011	Determine level of environmental review (EA or EIS)
Late summer 2011	Issue draft environmental review and hold open house for public comments

NOTE: Dates shown are estimates. During projects of this magnitude, unexpected issues may arise, resulting in the need to adjust the schedule.